Experiments

The two types of air pollutants are particulates (solids) and gases. The following experiments will acquaint students with both types.

GROUP I: TESTING FOR AIR PARTICLES

Solid particles of soot and dust are sometimes suspended in the air we breathe. These particles come from fuel combustion, construction projects, and harvesting operations as well as from natural sources. Eventually, these particles are inhaled by people and animals, fall into water supplies, or settle on surfaces as dust or grime.

ELEMENTARY LEVEL

Experiment I

Materials: Flashlight or slide projector

Procedure:

1. In a darkened room, turn on the beam of a flashlight or slide projector.
2. Observe the specks of dust floating in the light. These specks are particulate.

Discussion Question

1. Where do the particles come from?

Experiment II

Materials: Two 8-1/2 x 11 pieces of white paper
Petroleum jelly
Magnifying glass

Procedure:

1. Smear two clean white notebook-size pieces of paper with petroleum jelly.
2. Hang one sheet outdoors in a place protected from the rain.
3. Hang the second piece indoors away from open windows.
4. Compare the two sheets at the end of one day, one week, and two weeks. Also compare with a clean white sheet of paper.
5. Look at the particles with a magnifying glass.

Discussion Questions

1. How dirty is the air outside compared with the air inside?

2. Where do you think the particles came from?

HIGH SCHOOL LEVEL

Experiment I - Wind-Blown Particles

Materials: Sticky paper
2-3/4" glass jar
Spray lacquer
Magnifying glass
Microscope

Procedure:

1. Wrap adhesive-coated paper around a 2-3/4" glass jar with the adhesive side out.

2. Place the jar outdoors in an open air space off the ground. Mark "North" on the jar.

3. After seven days' exposure, spray the adhesive lightly with clear lacquer to fix the particles and prevent additional particles from collecting on the paper. (Be sure to have adequate ventilation when spraying lacquer.)

4. Examine under a microscope or with a magnifying glass.

5. Note the number of particles per square inch and the compass direction from which the particles were blown.

Discussion Questions

1. Are the particles vegetable material, erosion products, incineration, or industrial products?

2. Where do you think they came from?

NOTE: Generally, this experiment traps particles having diameters of 20 to 100 microns.

Experiment II - Air Particle Test

Materials: Filter paper
Balance or laboratory scales
Glass jar or beaker
Distilled water
Magnifying glass
Tape and thumb tacks
pH tester - litmus paper (or universal pH indicator paper)

Procedure:

1. Record the weight of each piece of filter paper you plan to use.

2. Select one or more exposure sites for the filter paper; anyplace where dust collects will do. Weigh any tape used to secure the filter paper at the exposure site.

3. After 3 to 7 days weigh the filter paper again. (Subtract weight of tape if necessary.) Note any increase in weight or change in color of the paper.

4. Use the magnifying glass to note the different sizes, colors, and shapes of particles collected on the filter paper.

5. Put some distilled water in a beaker or jar. Test the pH of the water and save the litmus paper.

6. Rinse the particles off the filter paper into the beaker and observe the particles with a magnifying glass.

7. Test the pH of the water with the particles suspended in the water. Compare the litmus paper to that used to test the distilled water in Item 5. Save both litmus papers.

8. Obtain a sample of particulate from a source such as an air conditioner or furnace filter. Rinse the particles into another beaker of distilled water. Observe what happens to the particles, check the pH, and compare the litmus papers.

Discussion Questions

1. Did you find evidence of air pollution particulates in your own environment?

2. Did you find that in a short time a significant buildup of particles can occur, even on a small piece of filter paper?

3. Do particulates differ in size, shape, and color?

4. Although particulates remain suspended in the atmosphere, do they differ in density and solubility?

GROUP II: TESTING FOR ACID GASES

One type of air pollutant is acid gas - a prime ingredient of urban air pollution. These gases may damage plants, corrode metals, crumble stone, and in heavy concentration, they can make people and animals ill.